Dr. Martin D. Müller

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Education

University of Bremen — Germany

Dr. rer. nat. in physics, Nov. 2002 (PhD equivalent). Exam taken as an external student after writing a dissertation about a four year joint project between ZSW Stuttgart (see below) and the Institute of Environmental Physics (IUP), University of Bremen. Thesis title: “Global Retrieval of Total Ozone and Ozone Profiles from GOME Data by Means of Neural Networks.”
PhD grade: “summa cum laude”

University of St Andrews — Scotland

Two term exchange program, 1994. Focusing on lasers and theoretical physics. Cambridge Certificate of Proficiency in English acquired.

University of Bayreuth — Germany

Physics Diploma, Feb. 1997 (M.Sc. equivalent). Special interest in geo- and atmospheric physics, ecological modeling. Diploma Thesis on retrieval of NO_2 and O_3 using Differential Optical Absorption (DOAS) with a ground-based spectrometer. Diploma Grade: 1.1 (1 = best, 5 = worst)

Employment

NASA Goddard Space Flight Center, Jul 2003–now — U.S.A.

- Implemented Solar Backscatter Ultraviolet (SBUV) radiance assimilation into the Global Earth Observation System/4 (GEOS-4) ozone data assimilation module, using a linearized forward model (at Global Modeling and Assimilation Office, GMAO).
- Investigated the use of nadir-sounder data for constraining ozone in the lower stratosphere using neural network methods.
- Contributed to the development of a fast solver for ordinary differential equations in atmospheric chemistry models using neural networks.
- Studied the effect of horizontal inhomogeneity of the ozone field on satellite-measured radiances.

Dutch Meteorological Service (KNMI), Mar–Jun 2003 Netherlands

- Investigated the possibility of using neural network-derived ozone profiles as *a priori* information for the KNMI Optimal Estimation based GOME profile retrieval system (OPERA), Mar-Jun 2003.
- Studied the applicability of neural network retrieval schemes to uncalibrated SCIAMACHY data, Mar-Jun 2003.

German Aerospace Center (DLR), Jan–Feb 2003 Germany

- Prepared NNORSY-GOME real-time ozone profile retrieval for GOME receiving stations run by DLR Oberpfaffenhofen.

Center for Solar Energy and Hydrogen Research (ZSW), 1998–2002 Germany

- Co-developed a neural network based total ozone retrieval system for NOAA-TOVS IR data.
- Developed a neural network based ozone profile and total ozone retrieval system (NNORSY) for GOME (Global Ozone Monitoring Experiment) high-resolution UV backscatter radiances, (in co-operation with Institute for Environmental Physics, Univ. Bremen).

Military Service, 1997 Germany

- Radio Reconnaissance Regiment 220, Donauwörth (Bavaria). Software development for prototypes of digital signal processor based standalone instruments (digital filter, spectral analysis).

Special Experience and Professional Society Memberships

- American Geophysical Union.
- American Meteorological Society Council for Artificial Intelligence Application in the Meteorological Sciences.
- European Space Agency GOME Ozone Profile Retrieval Working Group (GOPWG).
- Former member of the WMO International ATOVS Study Working Group (ITWG).
- Former member of the German Physical Society.
- Former Network Administrator for ZSW Stuttgart (ca. 100 clients).

Awards

2003–now	National Research Council PostDoc Associateship
1991–1997	German National Academic Foundation Scholarship
1991–1997	Bavarian State Government Grand for the Highly Gifted (“Bayerisches Begabtenförderungsgesetz”, BayBFG)

References

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Dr. John P. Burrows, Professor,
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e-mail: john.burrows@iup.physik.uni-bremen.de

Refereed Papers

Lary, D.J., H.Y. Mussa, M.D. Müller: Using neural networks to describe tracer correlations, *Atmosph. Chem. and Phys.*, 4, 143–146, 2004.

Müller, M.D., A.K. Kaifel, M. Weber, S. Tellmann, J.P. Burrows, D. Loyola: Ozone Profile Retrieval from GOME Data using a Neural Network Approach (NNORSY), *J. of Geophys. Res.* 106(D16), 4497–4515, 2003.

Müller, M.D., A.K. Kaifel, M. Weber, J.P. Burrows: A new Method for Retrieving Total Ozone from GOME Data, *Applied Optics*, 41(24), 5051–5058, 2002.

Papers in preparation

Müller, M.D., A.K. Kaifel, M. Weber, J.P. Burrows: Partial training of neural networks with incomplete target data, applied to atmospheric science. Submitted to *Neural Networks*.

Meijer, Y.J., R.J. van der A, P.K. Bhartia, G.E. Bodeker, K. Chance, L.E. Flynn, H.M. Kelder, B.J. Kerridge, M.D. Müller, R.F. van Oss, M. Weber, C. Zehner, *et al.*: Evaluation of GOME ozone profiles from nine different algorithms. In preparation.

Müller, M.D., P.K. Bhartia, I. Štajner: Assimilation of SBUV Version 8 radiances into the GEOS Ozone DAS. In preparation.

Müller, M.D., J. Joiner, P. Poli, P.K. Bhartia: The impact of horizontal ozone field inhomogeneities on measuring UV backscatter radiation from satellites. In preparation.

Conference Contributions

Müller, M.D., P.K. Bhartia, I. Štajner, Assimilation and Validation of Radiances from the Solar Backscatter UltraViolet/2 Instrument, AGU Fall Meeting, San Francisco, December 2004.

Müller, M.D., P.K. Bhartia, I. Štajner, Assimilation of SBUV Version 8 Radiances into the GEOS Ozone DAS, Proc. Quadrennial Ozone Symp. Kos, Greece, June 2004.

Müller, M.D., A.K. Kaifel: Ozone profile retrieval from GOME data using a neural network inverse model. In: Proc. Third Conference on Artificial Intelligence Applications to Environmental Science, Long Beach, California, February 2003, American Met. Soc.

Kaifel, A.K., M.D. Müller, M. Weber, S. Tellmann: *Neural Network Ozone Retrieval System for GOME spectra (NNORSY-GOME)*. In: Proc. EUROTRAC-2 Symposium 2002, P.M. Midgley, M. Reuther (Eds.), Markgraf Verlag, Weikersheim, Germany.

Müller, M.D., A.K. Kaifel, M. Weber: Ozone from GOME data using neural network technique. In: Sawaya-Lacoste, H. (Ed.), Proc. Of ERS-ENVISAT Symposium, Gothenburg, Sweden, 16–20 October 2000. ESA-ESTEC, ESA Public. Div. (SP-461), Noordwijk, The Netherlands, 2001.

Müller, M.D., A.K. Kaifel, M. Weber, S. Tellmann: Real-time total ozone and ozone profiles retrieved from GOME data using neural networks. In: Proc. 2001 EUMETSAT Meteorological Satellite Data User's Conference, Antalya, 1–5 October 2001. EUMETSAT, Darmstadt, Germany, 2001.

Müller, M.D. and A.K. Kaifel, Efficient processing of multi-year global TOVS data using ITPP, 3I and neural networks, Techn. Proc. 10th Int. TOVS Study Conference, pp. 397–407, Boulder, CO, USA, 1999.

Seminar Talks

"Experiences with SBUV radiance assimilation for the GEOS-4 Ozone DAS" at the Department of Physics Seminar, University of Toronto, Canada, February 2005 (invited).

"Linearized SBUV radiance assimilation for ozone analysis" at the NASA-GSFC Atmospheric Chemistry and Dynamics Branch lunch seminar series, Greenbelt, MD, USA, November 2004.

"Introduction to Neural Networks" at the University of Maryland, Baltimore County, Physics Department seminar series, April 2004 (invited).

"Introduction to Neural Networks" at the NASA-GSFC Algorithms for the New Chemistry Missions Seminar, March 2004 (invited).

"Using neural networks for GOME ozone retrieval - an overview" at the EMC/NOAA seminar series, Environmental Modeling Center NWS/NCEP/NOAA, Camp Spring, MD, USA, December 2003 (invited).

"The Neural Network Ozone Retrieval System (NNORSY) for GOME ozone profiles" at the Environmental Physics seminar series, University of Bremen, Germany, May 2002.

"Ozone Profiles from GOME Data Using Neural Network Technique" at the ESA/ESRIN GOME Data Exploitation Meeting, Frascati, Italy, April 2001.

"Real-Time Total Ozone and Ozone Profiles from TOVS and GOME Data Using Neural Networks" at the Data Assimilation Office (DAO) seminar series, GSFC, Greenbelt, USA, September 2001 (invited).

"Real-Time Total Ozone and Ozone Profiles from TOVS and GOME Data Using Neural Networks" at the Cooperative Institute for Meteorological Satellite Studies (CIMSS), Univ. of Wisconsin, Madison, WI, September 2001 (invited).

"Recent developments of the ZSW GOME ozone retrieval scheme" at the GOME Ozone Profile Validation Group meeting, University of Leicester, UK, November 2001.

"On the use of neural networks for ozone retrieval from satellite data" (in German) at the University of Bremen Atmospheric Physics Department Seminar Series, November 1999 (invited).

Other Interests Hiking, cycling, biology, drawing, ballroom and Scottish folk dancing, traditional archery, strategy and role-playing games, astronomy.